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[54] **GPS VEHICLE COLLISION AVOIDANCE WARNING AND CONTROL SYSTEM AND METHOD**

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Related U.S. Application Data

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[51] **Int. Cl.**[6] **G06F 165/00**

[52] **U.S. Cl.** **701/301**; 701/27; 701/98; 701/214; 340/903; 340/436; 342/455

[58] **Field of Search** 701/23, 24, 27, 701/200, 213, 214, 93, 98, 300, 301; 340/903, 905, 435, 436; 342/29, 41, 454, 455; 180/167–170

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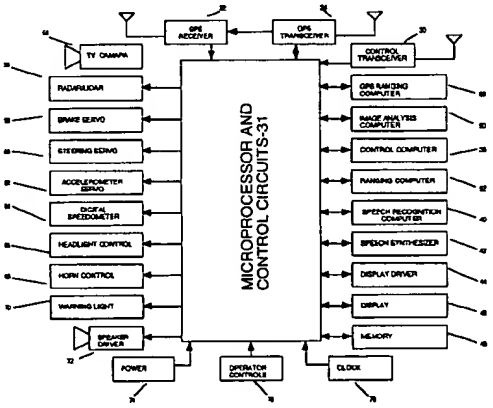
[57] **ABSTRACT**

GPS satellite (**4**) ranging signals (**6**) received (**32**) on comm**1**, and DGPS auxiliary range correction signals and pseudolite carrier phase ambiguity resolution signals (**8**) from a fixed known earth base station (**10**) received (**34**) on comm**2**, at one of a plurality of vehicles/aircraft/automobiles (**2**) are computer processed (**36**) to continuously determine the one's kinematic tracking position on a pathway (**14**) with centimeter accuracy. That GPS-based position is communicated with selected other status information to each other one of the plurality of vehicles (**2**), to the one station (**10**), and/or to one of a plurality of control centers (**16**), and the one vehicle receives therefrom each of the others' status information and kinematic tracking position. Objects (**22**) are detected from all directions (**300**) by multiple supplemental mechanisms, e.g., video (**54**), radar/lidar (**56**), laser and optical scanners. Data and information are computer processed and analyzed (**50,52,200,452**) in neural networks (**132**, FIGS. **6–8**) in the one vehicle to identify, rank, and evaluate collision hazards/objects, an expert operating response to which is determined in a fuzzy logic associative memory (**484**) which generates control signals which actuate a plurality of control systems of the one vehicle in a coordinated manner to maneuver it laterally and longitudinally to avoid each collision hazard, or, for motor vehicles, when a collision is unavoidable, to minimize injury or damage therefrom. The operator is warned by a heads up display and other modes and may override. An automotive auto-pilot mode is provided.

44 Claims, 17 Drawing Sheets



VEHICLE SYSTEM BLOCK DIAGRAM